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## THE PROGRESS OF SCIENCE

PROFESSOR EINSTEIN'S VISIT  
TO THE UNITED STATES

Plans have been under consideration for lectures by Professor Einstein in the United States, but his arrival at the beginning of April on a mission to promote the Zionist movement was a surprise. He is accompanied by Professor Chaim Weizmann, director of the chemical research laboratories of the British Admiralty during the war, now head of the World Zionist Organization, and two other leaders in the movement. Professor Einstein is reported to be especially interested in the establishment of a University of Jerusalem and to be ready to take part in its work, but it is not likely that he will leave Berlin permanently. Professor Bergson has denied the report that he would leave Paris to become professor at Jerusalem.

Arrangements were promptly made for scientific lectures by Professor Einstein at several universities, the first being appropriately given at Columbia University, which awarded to him last year the Barnard Medal on the recommendation of the National Academy of Sciences. Four lectures have been given at the College of the City of New York and a series of five lectures is announced to be given at Princeton University from May 9 to 13. Scientific men are invited to attend the Princeton lectures; those wishing to do so should write to Professor H. A. Thompson.

It is satisfactory that there should be such widespread popular interest in Professor Einstein and his work. In the article on the History of Mathematics by Professor Ernest Brown in the present issue of the MONTHLY and in the article on the History of Physics by the late Professor Andrews Henry Bumstead in the last issue will be found statements of Professor Einstein's con-

tributions in their historic continuity. An article on the Theory of Relativity by Professor E. B. Wilson was printed in the issue of the MONTHLY for March, 1920. In the issue of *Nature* for February 17 last will be found a series of articles on all aspects of the theory of relativity. Professor Einstein himself contributes an article on the development of his theory in which he writes:

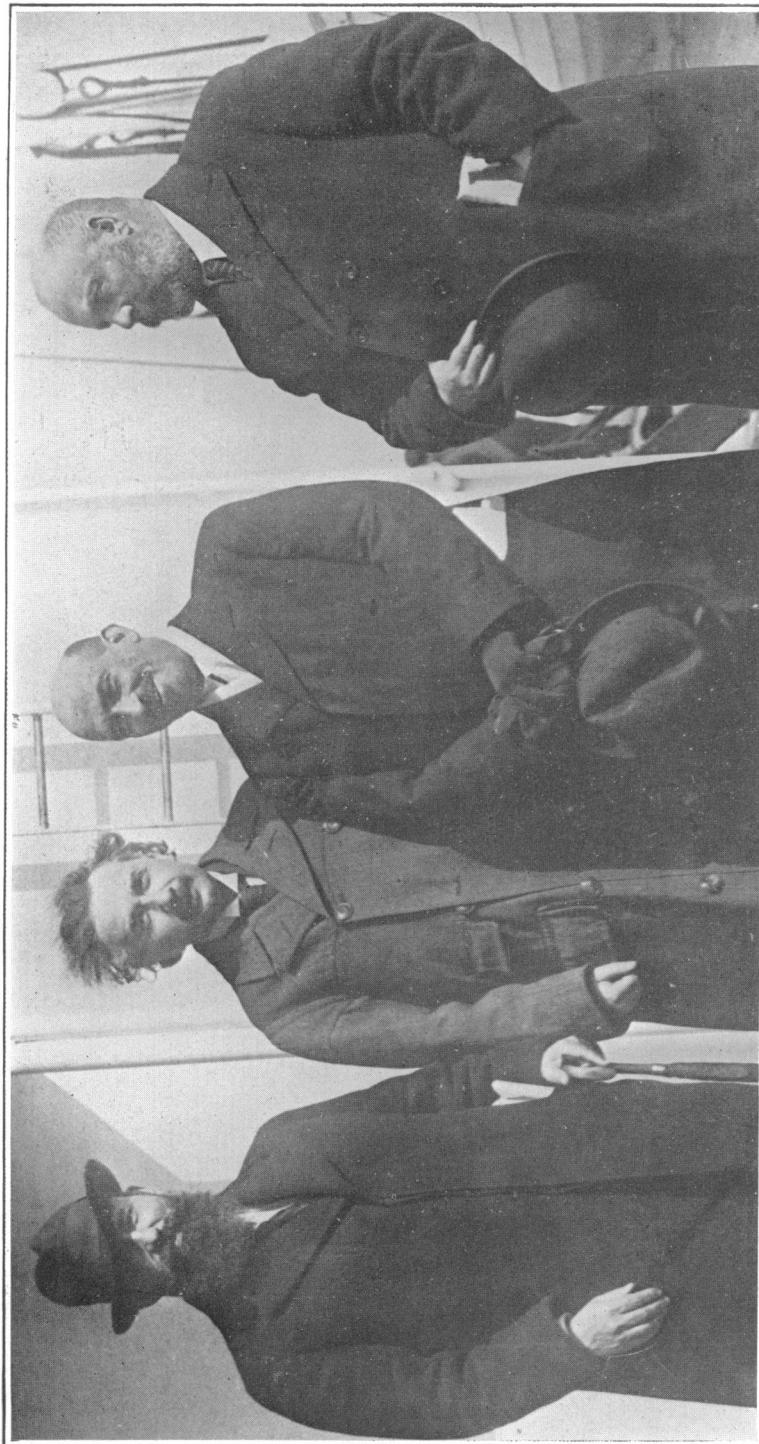
The development of the special theory of relativity consists of two main steps, namely the adaptation of the space-time "metrics" to Maxwell's electro-dynamics, and an adaptation of the rest of physics to that altered space-time "metrics." The first of these processes yields the relativity of simultaneity, the influence of motion on measuring-rods and clocks, a modification of kinematics, and in particular a new theorem of addition of velocities. The second process supplies us with a modification of Newton's law of motion for large velocities, together with information of fundamental importance on the nature of inertial mass.

It was found that inertia is not a fundamental property of matter, nor, indeed, an irreducible magnitude, but a property of energy. If an amount of energy  $E$  be given to a body, the inertial mass of the body increases by an amount  $E/c^2$ , where  $c$  is the velocity of light in *vacuo*. On the other hand, a body of mass  $m$  is to be regarded as a store of energy of magnitude  $mc^2$ .

Furthermore, it was soon found impossible to link up the science of gravitation with the special theory of relativity in a natural manner. In this connection I was struck by the fact that the force of gravitation possesses a fundamental property, which distinguishes it from electro-magnetic forces. All bodies fall in a gravitational field with the same acceleration, or—what is only another formulation of the same fact—the gravitational and inertial masses of a body are numerically equal to each other. This numerical equality suggests identity in character. Can gravitation and inertia be identical? This question leads directly to the General Theory of Relativity. Is it not pos-



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PROFESSOR EINSTEIN DR. WEIZMANN

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sible for me to regard the earth as free from rotation, if I conceive of the centrifugal force, which acts on all bodies at rest relatively to the earth, as being a "real" field of gravitation, or part of such a field? If this idea can be carried out, then we shall have proved in very truth the identity of gravitation and inertia. For the same property which is regarded as *inertia* from the point of view of a system not taking part in the rotation can be interpreted as *gravitation* when considered with respect to a system that shares the rotation. According to Newton, this interpretation is impossible, because by Newton's law the centrifugal field can not be regarded as being produced by matter, and because in Newton's theory there is no place for a "real" field of the "Koriolis-field" type. But perhaps Newton's law of field could be replaced by another that fits in with the field which holds with respect to a "rotating" system of coordinates? My conviction of the identity of inertial and gravitational mass aroused within me the feeling of absolute confidence in the correctness of this interpretation. In this connection I gained encouragement from the following idea. We are familiar with the "apparent" fields which are valid relatively to systems of coordinates possessing arbitrary motion with respect to an inertial system. With the aid of these special fields we should be able to study the law which is satisfied in general by gravitational fields.

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